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Shock Chlorination for tube wells

Introduction

Shock chlorination for a tube well is a process of disinfection or de-contaminate any large scale contamination in terms of bacteriological or pathogenically by waste water infiltration from latrine or any other sources, flooding etc.. Any breakdown in the system or during the drilling process this contamination may occur.

Very common final dose for Sock chlorination is 200 ppm or mg/L. Generally, shock chlorination is done in following circumstances:

1. Just drilled new tube well after well development
2. Tube well after repair works
3. After floods
4. In case of any waterborne diseases outbreaks
5. When water quality shows presence of e-coli

Shock chlorination can eliminate the pathogens (diseases causing) and other nuisance organisms that cause tastes, odors, and slime. The limitation of shock chlorination is that it cannot ensure the quality of water for long run and regular basis.

Shock chlorination procedure

Step 1
Ask families to store sufficient water or arrange alternate source of water to meet their family needs for 12 to 48 hours.

Step 2

Prepare Stock solution (1%) from HTH granule or Liquid chlorine solution of known strength. Please follow the calculation methods as given in chlorine solution preparation guidelines. Do not forget to take necessary precautions by having protective gears such as gloves, goggles and masks.

Step 3
Remove pump and all accessories from the tube well before starting shock chlorination. Measure water depth from ground and calculate total volume of water in the tube well. Consider 3 times more volume than the actual water volume in the tube well for calculation.

Step 4
Calculate amount of Chlorine solution (1%), required to Obtain a Chlorine Concentration of 200 ppm (mg/L) in well (consider 3 times more than the actual volume of water in the well). Use a clean container to prepare the solution. See below for detailed calculation to calculate the volume of stock solution for shock chlorination.

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Calculation Example:

We have to do shock chlorination of a tube well with 600 feet deep which has 150' deep 4" dia. casing pipe and remaining with 1.5" pipe. Water level is at 50' below the ground level. Calculate volume of 10% stock chlorine solution required to get final concentration of 200 ppm (mg/L) in the well.

Volume of water in 1.5"pipe

$$Vi = \frac{\pi d^2}{4} * h$$ *Here, d=1.5" ; and h = 600' - 150' = 450'*

Applying these values we get V_i = 5.52 cu.ft.

Similarly, Volume of water in 4" pipe, (here h (water depth in 4" pipe), which is 100')

V_{ii} = 8.72 cu.ft.

Total volume of water $V = V_i + V_{ii}$ = 5.52 + 8.72 = 14.24 cu.ft. = 0.403 cu m. = 403 litres

Take 3 times more volume than the total volume of water in the well.

So, volume considered = 3 x 403 litres = 1209 litres.

Now, we have 1% stock solution and want to make 200 ppm (mg/L) for 1209 Litres

Volume of stock solution needed = (1209 L x 200ppm) / (1x10,000ppm)[1]

= 24.18 L (approx. 24 litres)

We need 24 litres of 1% Chlorine stock solution to do stock chlorination of given tube well.

Step 5

Siphon or pour this solution slowly into the well (see Figure below, Siphoning Chlorine Solution). As you are adding the chlorine solution, take precautions to protect yourself from splashing chlorine and fumes. Protect your eyes with safety goggles, and wear protective gloves and clothing.

Step 6

Leave the chlorine solution in the well and stop pumping or distribution for 12 to 48 hours. The longer the contact time, the better the results.

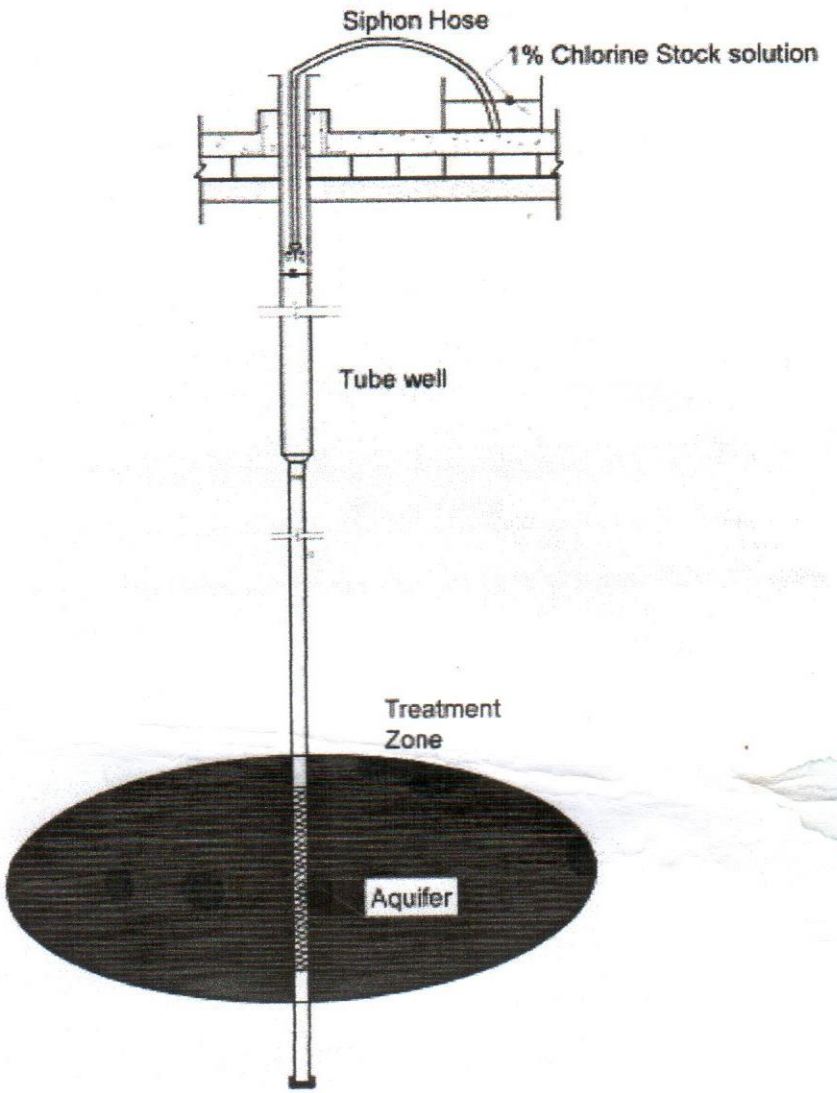
Step 7

After the chlorine has been left in the well (and the plumbing system if applicable) for a minimum of 12 hours, the chlorinated water can be discharged or pumped out. Large amounts of chlorinated water should not be discharged into the septic tank, or onto lawns or gardens. Do not over-pump your well.

Step 8

Check Free Residual chlorine of the pumped water, to ensure the safe chlorine level. When Free Residual Chlorine comes to a range of 0.5 - 1 mg/L, stop pumping and allow users for consumption.

[1] Note: 1% solution equivalent to 10,000 ppm or mg/L (or 10 gm/L)



Siphoning Chlorine solution into the tube well.